

## CLAIMS

What is claimed is:

1. A peptide comprising a peptide derivative of the HJ loop of a serine/threonine kinase, wherein:
  - 5 a) said peptide has between about five and about twenty amino acids or amino acid analogs;
  - b) said peptide modulates activity of the serine/threonine kinase; and
  - c) said peptide is cyclic.
- 10 2. A peptide comprising a peptide derivative of the HJ loop of a serine/threonine kinase, wherein:
  - a) said peptide has between about five and about twenty amino acids or amino acid analogs;
  - b) said peptide modulates activity of the serine/threonine kinase; and
  - 15 c) said peptide has an N-terminus and a C-terminus which are unsubstituted.
- 20 3. A peptide which is an amino acid sequence or a subsequence of an HJ loop of a serine/threonine kinase, with the proviso that any one amino acid in the sequence of the peptide derivative can vary, being any amino acid or analog thereof.
4. A peptide comprising a peptide derivative of the HJ loop of a serine/threonine kinase, wherein:
  - 25 a) said peptide has between about five and about twenty amino acids or amino acid analogs;
  - b) said peptide modulates activity of the serine/threonine kinase; and

c) the serine/threonine kinase is member of a serine/threonine kinase family selected from the group of families consisting of Raf, mitogen-activated protein kinases (MAP kinases), G protein-coupled receptor kinases, or the serine/threonine kinase is selected from the group consisting of protein kinase C, cyclic AMP dependent kinase, calmodulin dependent kinase, cyclic GMP dependent protein kinase, Akt/PKB and GSK3.

5           5. The peptide of Claim 4 wherein the serine/threonine kinase is from the Raf family and is selected from the group consisting of Raf-1, A-Raf and B-Raf.

10          6. The peptide of Claim 4 wherein the serine/threonine kinase is a G-protein dependent kinase selected from the group consisting of  $\beta 2$ -adrenergic receptor kinases, rhodopsin kinase and GRK4-6.

15          7. A peptide having the sequence of HJ-38 (SEQ ID NO.: 13), J-41 (SEQ ID NO.: 14), J-47 (SEQ ID NO.: 20), J-48 (SEQ ID NO.: 21), J-29 (SEQ ID NO.: 22), K014H010 (SEQ ID NO.: 63), K014H111 (SEQ ID NO.: 64), K048H901 (SEQ ID NO.: 66), K098H901 (SEQ ID NO.: 67), or K107H901 (SEQ ID NO.: 68).

20          8. A peptide having the sequence of HJ-38 (SEQ ID NO.: 13), J-41 (SEQ ID NO.: 14), J-47 (SEQ ID NO.: 20), J-48 (SEQ ID NO.: 21), J-29 (SEQ ID NO.: 22), K014H010 (SEQ ID NO.: 63), K014H111 (SEQ ID NO.: 64), K048H901 (SEQ ID NO.: 66), K098H901 (SEQ ID NO.: 67), or K107H901 (SEQ ID NO.: 68), with the proviso that any one amino acid residue in the peptide can vary, being any naturally occurring amino acid or analog thereof.

25          9. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

5 AA<sub>2</sub> is selected from the group consisting of glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

10 AA<sub>4</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>5</sub> is selected from the group consisting of alanine, serine and threonine;

AA<sub>6</sub> is glycine or alanine;

15 AA<sub>7</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>8</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>9</sub> is proline;

20 AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>11</sub> is selected from the group consisting of alanine, serine and threonine;

25 AA<sub>12</sub> is selected from the group consisting of histidine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

5 AA<sub>15</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

10 AA<sub>16</sub> is selected from the group consisting of arginine, N-nitroarginine, β-cycloarginine, γ-hydroxyarginine, N-amidinocitruline and 2-amino-4-guanidinobutanoic acid;

15 AA<sub>17</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

20 AA<sub>18</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>19</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine; and

AA<sub>20</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine.

10. The peptide of Claim 9 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the  
25 subsequence thereof corresponds to the sequence of the HJ loop of Raf (SEQ ID NO.: 1) or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

11. The peptide of Claim 9 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence or a subsequence of the HJ loop of Raf (SEQ ID NO.: 1), with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.
- 5      12. The peptide of Claim 10 or Claim 11 wherein the peptide comprises an eight amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub> through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.
- 10     13. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein:
  - AA<sub>1</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;
  - AA<sub>2</sub> is selected from the group consisting of glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;
  - AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;
  - AA<sub>4</sub> is alanine or glycine;
  - 20     AA<sub>5</sub> is selected from the group consisting of alanine, leucine, isoleucine, methionine and valine;
  - AA<sub>6</sub> is glycine or alanine;
  - AA<sub>7</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;
  - 25     AA<sub>8</sub> is proline;
  - AA<sub>9</sub> is proline;

AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>11</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

5 AA<sub>12</sub> is glycine or alanine;

AA<sub>13</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

10 AA<sub>14</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>15</sub> is proline;

15 AA<sub>16</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>17</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

20 AA<sub>18</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>19</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan; and

25 AA<sub>20</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid.

14. The peptide of Claim 13 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence of the HJ loop of cyclic AMP

dependent kinase (SEQ ID NO.: 2) or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

15. The peptide of Claim 13 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the  
5 subsequence thereof corresponds to the sequence or a subsequence of the HJ  
loop of cyclic AMP dependent kinase (SEQ ID NO.: 2), with the proviso that  
any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence  
thereof can vary.
16. The peptide of Claim 14 or Claim 15 wherein the peptide comprises an eight  
10 amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the  
subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub>  
through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.
17. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a  
15 subsequence thereof comprising at least five amino acids, wherein:  
AA<sub>1</sub> is selected from the group consisting of tyrosine, phenylalanine and  
tryptophan;  
AA<sub>2</sub> is selected from the group consisting of glutamine, asparagine,  
glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl,  
substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or  
20 aspartic acid;  
AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine,  
methionine and valine;  
AA<sub>4</sub> is selected from the group consisting of leucine, isoleucine,  
methionine and valine;  
AA<sub>5</sub> is selected from the group consisting of cysteine, alanine, leucine,  
25 isoleucine, methionine and valine;

AA<sub>6</sub> is glycine or alanine;

AA<sub>7</sub> is selected from the group consisting of histidine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

5 AA<sub>8</sub> is selected from the group consisting of proline, alanine and serine;

AA<sub>9</sub> is proline;

AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

10 AA<sub>11</sub> is selected from the group consisting of histidine, glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>12</sub> is glycine or alanine;

15 AA<sub>13</sub> is selected from the group consisting of glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

20 AA<sub>14</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

25 AA<sub>15</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>16</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>17</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

5 AA<sub>18</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>19</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan; and

10 AA<sub>20</sub> is selected from the group consisting of histidine glutamic acid, and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid.

18. The peptide of Claim 17 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence of the HJ loop of protein kinase C (SEQ ID NO.: 3) or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.
19. The peptide of Claim 17 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to a sequence or a subsequence of the HJ loop of protein kinase C (SEQ ID NO.: 3), with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.
20. The peptide of Claim 18 or Claim 19 wherein the peptide comprises an eight amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub> through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.

21. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

5 AA<sub>2</sub> is lysine or ornithine;

AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>4</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

10 AA<sub>5</sub> is selected from the group consisting of arginine, N-nitroarginine,  $\beta$ -cycloarginine,  $\gamma$ -hydroxyarginine, amidinocitruline and 2-amino-4-guanidinobutanoic acid;

AA<sub>6</sub> is glycine or alanine;

AA<sub>7</sub> is histidine;

15 AA<sub>8</sub> is serine or threonine;

AA<sub>9</sub> is proline;

AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

20 AA<sub>11</sub> is selected from the group consisting of arginine, N-nitroarginine,  $\beta$ -cycloarginine,  $\gamma$ -hydroxyarginine, amidinocitruline and 2-amino-4-guanidinobutanoic acid;

25 AA<sub>12</sub> is selected from the group consisting of glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>13</sub> is histidine;

AA<sub>14</sub> is lysine or ornithine;

AA<sub>15</sub> is serine or threonine;

AA<sub>16</sub> is lysine or ornithine;

AA<sub>17</sub> is selected from the group consisting of glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

5 AA<sub>18</sub> is lysine or ornithine;

AA<sub>19</sub> is histidine; and

AA<sub>20</sub> is selected from the group consisting of glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid.

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22. The peptide of Claim 21 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence of the HJ loop of bARK1.2 (SEQ ID NO.: 4) or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

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23. The peptide of Claim 21 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence or a subsequence of the HJ loop of bARK1.2 (SEQ ID NO.: 4), with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

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24. The peptide of Claim 22 or Claim 23 wherein the peptide comprises an eight amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub> through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.

25. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

5 AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

10 AA<sub>4</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>5</sub> is selected from the group consisting of cysteine, serine and threonine;

AA<sub>6</sub> is glycine or alanine;

15 AA<sub>7</sub> is selected from the group consisting of arginine, N-nitroarginine,  $\beta$ -cycloarginine,  $\gamma$ -hydroxyarginine, N-amidinocitruline and 2-amino-4-guanidinobutanoic;

AA<sub>8</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>9</sub> is proline;

20 AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>11</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>12</sub> is asparagine or glutamine;

AA<sub>13</sub> is asparagine or glutamine;

25 AA<sub>14</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, aromatic, substituted aromatic acid, benzylic or substituted benzylic ester of aspartic acid or glutamic acid;

AA<sub>15</sub> is selected from the group consisting of lysine, ornithine and histidine;

AA<sub>16</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, aromatic, substituted aromatic acid, benzylic or substituted benzylic ester of aspartic acid or glutamic acid;

5 AA<sub>17</sub> is selected from the group consisting of arginine, N-nitroarginine,  $\beta$ -cycloarginine,  $\gamma$ -hydroxyarginine, N-amidinocitruline, 2-amino-4-guanidinobutanoic, lysine and ornithine;

AA<sub>18</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

10 AA<sub>19</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>20</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, aromatic, substituted aromatic acid, benzylic or substituted benzylic ester of aspartic acid or glutamic acid.

26. The peptide of Claim 25 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the  
15 subsequence thereof corresponds to the sequence of the HJ loop of Akt/PKB  
(SEQ ID NO.: 7) or a subsequence thereof, with the proviso that any two amino  
acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

27. The peptide of Claim 25 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the  
20 subsequence thereof corresponds to the sequence or a subsequence of the HJ loop  
of Akt/PKB (SEQ ID NO.: 7), with the proviso that any one amino acid in the  
sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

28. The peptide of Claim 26 or Claim 27 wherein the peptide comprises an eight  
25 amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the  
subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub>  
through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.

29. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

5 AA<sub>2</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

10 AA<sub>4</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>5</sub> is selected from the group consisting of glutamine, leucine, isoleucine, methionine and valine;

AA<sub>6</sub> is glycine or alanine;

15 AA<sub>7</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>8</sub> is proline;

AA<sub>9</sub> is proline;

AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

20 AA<sub>11</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>12</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

25 AA<sub>13</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>14</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

5 AA<sub>15</sub> is selected from the group consisting of asparagine, glutamine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>16</sub> is histidine;

10 AA<sub>17</sub> is selected from the group consisting of arginine, N-nitroarginine, β-cycloarginine, γ-hydroxyarginine, amidinocitruline, 2-amino-4-guanidinobutanoic acid lysine and ornithine;

AA<sub>18</sub> is selected from the group consisting of lysine, ornithine, leucine, isoleucine, methionine and valine;

15 AA<sub>19</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan; and

AA<sub>20</sub> is selected from the group consisting of glutamine, asparagine, glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid.

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30. The peptide of Claim 29 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence of the HJ loop of calmodulin dependent kinase (SEQ ID NO.: 5) or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

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31. The peptide of Claim 29 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence or a subsequence of the HJ loop

of calmodulin dependent kinase (SEQ ID NO.: 5), with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

32. The peptide of Claim 30 or Claim 31 wherein the peptide comprises an eight amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub> through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.  
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33. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence of the HJ loop of polo (SEQ ID NO.: 6) or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.  
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34. A peptide comprising a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence or a subsequence of the HJ loop of polo (SEQ ID NO.: 6), with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.  
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35. The peptide of Claim 33 or Claim 34, wherein the peptide comprises an eight amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub> through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.  
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36. A peptide comprising a sequence of amino acid residues AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acid residues, wherein:

- AA<sub>1</sub> is alanine or glycine;
- AA<sub>2</sub> is glutamic acid, aspartic acid or an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;
- AA<sub>3</sub> is leucine, isoleucine, methionine or valine;
- AA<sub>4</sub> is leucine, isoleucine, methionine or valine;
- AA<sub>5</sub> is leucine, isoleucine, methionine or valine;
- AA<sub>6</sub> is glycine or alanine;
- AA<sub>7</sub> is asparagine or glutamine;
- AA<sub>8</sub> is proline;
- AA<sub>9</sub> is leucine, isoleucine, methionine or valine;
- AA<sub>10</sub> is tyrosine, phenylalanine and tryptophan;
- AA<sub>11</sub> is proline;
- AA<sub>12</sub> is glycine or alanine;
- AA<sub>13</sub> is aspartic acid, glutamic acid or an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of aspartic acid or glutamic acid;
- AA<sub>14</sub> is serine or threonine;
- AA<sub>15</sub> is glycine or alanine;
- AA<sub>16</sub> is leucine, isoleucine, methionine or valine;
- AA<sub>17</sub> is glutamic acid, aspartic acid or an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;
- AA<sub>18</sub> is asparagine or glutamate;
- AA<sub>19</sub> is leucine, isoleucine, methionine or valine; and
- AA<sub>20</sub> is leucine, isoleucine, methionine or valine.

37. The peptide of Claim 36, wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence of the HJ loop of GSK3 (SEQ ID NO.: 12) or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

5 38. The peptide of Claim 36, wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof corresponds to the sequence or a subsequence of the HJ loop of GSK3 (SEQ ID NO.: 12), with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary.

10 39. The peptide of Claim 37 or Claim 38, wherein the peptide comprises an eight amino acid subsequence of the sequence A<sub>1</sub> through AA<sub>20</sub>, wherein the subsequence is selected from the group consisting of AA<sub>3</sub> through AA<sub>10</sub>, AA<sub>7</sub> through AA<sub>14</sub> and AA<sub>11</sub> through AA<sub>18</sub>.

15 40. A method of identifying a peptide which modulates the activity of a serine/threonine kinase comprising the steps of:

20 a) providing a peptide, referred to as a "test peptide", comprising a peptide derivative of the HJ loop of said serine/threonine kinase and having from about five to about twenty amino acids or analogs thereof;

b) incubating the test peptide with cells having one or more cellular activities controlled by a serine/threonine kinase under conditions suitable for assessing activity of the serine/threonine kinase;

c) assessing activity of the serine/threonine kinase, wherein greater or lesser activity compared with the cells grown without incubation of the test peptide indicates that the peptide modulates activity of the serine/threonine kinase.

41. The method of Claim 40, wherein the activity of the serine/threonine kinase is assessed by measuring the rate of survival or proliferation of said cells in tissue culture.
42. A method of modulating the activity of a serine/threonine kinase in a subject, comprising administering a therapeutically effective amount of a peptide comprising a peptide derivative of the HJ loop of a serine/threonine kinase, wherein:
  - a) said peptide has between about five and about twenty amino acids or amino acid analogs; and
  - b) said peptide modulates activity of the serine/threonine kinase.